

Dengue Case Management

Presumptive Diagnosis

Live in / travel to (in the last 14 days) endemic area plus **fever** and **two of the following**:

- ▶ Nausea and vomiting
- ▶ Rash
- ▶ Aches and pains (headache, eye pain, muscle ache or joint pain)
- ▶ Any warning signs
- ▶ Positive tourniquet test
- ▶ Leukopenia

Warning Signs

- ▶ Intense continuous abdominal pain or pain when palpating abdomen
- ▶ Persistent vomiting (≥ 3 episodes in 1 hr or ≥ 4 in 6 hrs)
- ▶ Fluid accumulation (pleural effusion, ascites, or pericardial effusion)
- ▶ Mucosal bleeding (gums, nose, vagina [metrorrhagia or hypermenorrhagia], kidney [macroscopic hematuria])
- ▶ Altered mental status (irritability, drowsiness, Glasgow Coma Scale score < 15)
- ▶ Hepatomegaly (≥ 2 cm below costal margin)
- ▶ Progressive increase of the hematocrit (in at least 2 consecutive measurements taken 6 hours apart)

**No
warning signs**

**For patients with
warning signs of
severe dengue OR any
of the following:**

- ▶ Pregnancy
- ▶ Acute renal failure
- ▶ Coagulopathy
- ▶ Shortness of breath
- ▶ Not tolerating oral fluids
- ▶ Co-existing conditions and social risk on a case-by-case basis*

**For patients with any
of the following:**

- ▶ Shock or respiratory distress due to plasma leakage
- ▶ Clinically significant bleeding
- ▶ Severe organ impairment (myocarditis, hepatitis [ALT or AST > 1000 IU] encephalitis)

**Group A
Outpatient management**

**Group B
Inpatient management**

**Group C
Inpatient management**

*For co-existing conditions and social risk see page 6, item #9.



Dengue Management DO's and DON'Ts

- X DON'T use corticosteroids routinely.** They are not routinely indicated and can increase the risk of GI bleeding, hyperglycemia, and immunosuppression.
 - X DON'T give prophylactic platelet transfusions or for a low platelet count.** Platelet transfusions do not decrease the risk of severe bleeding and may instead lead to fluid overload and prolonged hospitalization.
 - X DON'T give half normal (0.45%) saline.** It leaks into third spaces and may worsen ascites and pleural or pericardial effusions.
 - X DON'T assume that IV fluids are necessary.** First check if the patient can take fluids orally. Use only the minimum amount of IV fluid to keep the patient well-perfused. Decrease IV fluid rate as hemodynamic status improves or urine output increases.
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- ✓ DO tell outpatients when to return.** Teach them about warning signs and their timing, and the critical phase that follows defervescence.
- ✓ DO recognize the critical phase.** The critical phase begins with defervescence or an increasing hematocrit and lasts for 24-48 hours. During this phase some patient may deteriorate within hours and require close monitoring.
- ✓ DO closely monitor fluid intake and output, vital signs, and hematocrit levels.** Intake and output should be monitored according to hemodynamic status and severity of clinical presentation as outlined in the treatment algorithms.
- ✓ DO recognize and treat early shock.** Early shock (also known as compensated or normotensive shock) is characterized by narrowing pulse pressure (systolic minus diastolic BP $\leq$ 20 mmHg), increasing heart rate, and delayed capillary refill or cool extremities.
- ✓ DO administer colloids (such as albumin) for refractory shock.** Patients who do not respond to 2-3 boluses of isotonic saline should be given colloids instead of more saline.
- ✓ DO give pRBCs or whole blood for clinically significant bleeding.** If hematocrit is dropping with unstable vital signs or significant bleeding is apparent, immediately transfuse blood.

Group A

Outpatient Management

Patients without warning signs, coexisting conditions or social risk (see page 6)

During the febrile phase (2–7 days) and subsequent critical phase (1–2 days) you should evaluate your patients daily

- » Order and review complete blood cell counts
- » Monitor for dehydration, warning signs, and defervescence (indicating the beginning of the critical phase)

Advise patient or their family to do the following

Control the fever

- Give acetaminophen at 6 hour intervals if the patient is febrile (no more than 4 doses per day). Do not give ibuprofen or aspirin-containing drugs.
- Sponge patient's skin with tepid water when temperature is high.

Prevent dehydration which occurs when a person loses too much fluid (from high fever, vomiting, or poor oral intake). Give plenty of fluids (not only water) and watch for signs of dehydration. Bring patient to clinic or emergency room if any of the following signs develop:

- Decrease in urination (check number of wet diapers or trips to the bathroom)
- Few or no tears when child cries
- Dry mouth, tongue or lips
- Sunken eyes
- Listlessness, agitation, or confusion
- Fast heartbeat (>100/min)
- Cold or clammy fingers and toes
- Sunken fontanel in an infant

Prevent spread of dengue within your house

- The patient should sleep under a bed net. Everyone in the house should use EPA*-registered insect repellent.
- Empty and scrub containers that hold water in and around the home.
- Place screens on windows and doors to prevent mosquitoes from entering the home.

Fever usually lasts 2-7 days and warning signs commonly appear as the fever starts to decline.

Return **immediately** to clinic or emergency department if any of the following warning signs appear:

- Severe abdominal pain or persistent vomiting
- Bleeding from nose or gums
- Abnormal vaginal bleeding
- Vomiting blood
- Black, tarry stools
- Drowsiness or irritability
- Pale, cold, or clammy skin
- Difficulty breathing

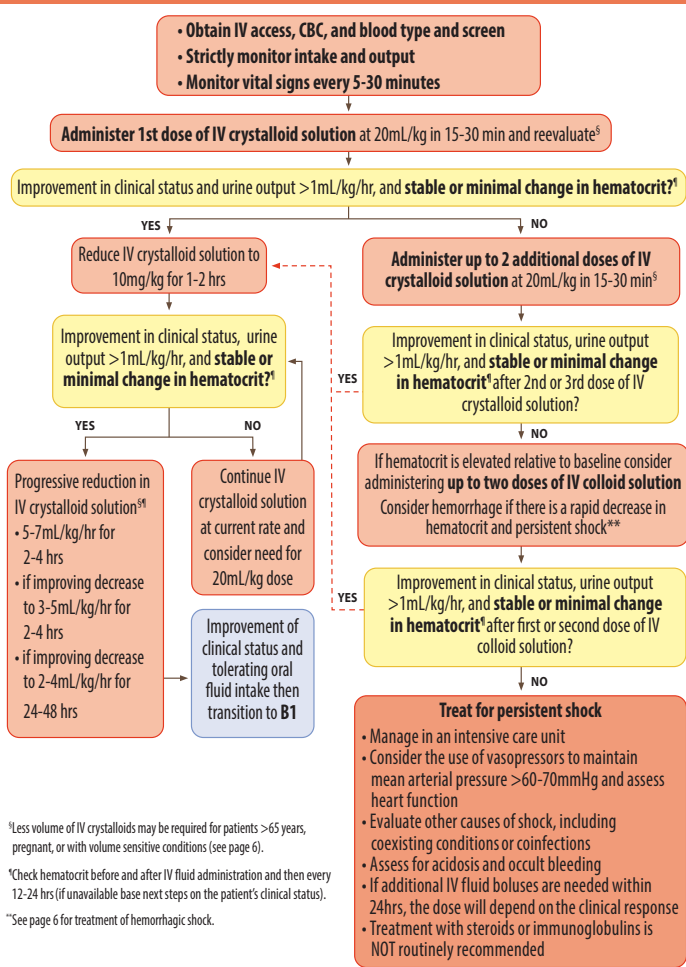
*EPA: Environmental Protection Agency

Does the patient have any dengue warning signs? (See page 1)



Group C

Inpatient Management for Patients with Compensated or Hypotensive Shock



Clinical Criteria for Hospitalization and Discharge, and Recommendations for Fluid Management and Hemorrhagic Shock

Criteria for Hospitalization

- Presence of any warning sign
- Shortness of breath
- Pregnancy, acute renal failure or coagulopathy
- Compensated or hypotensive shock (see pg7)
- Signs and symptoms of plasma leakage:
 - Pleural or pericardiac effusions
 - Ascites or gallbladder wall edema
- Severe hemorrhage or spontaneous bleeding
- Organ dysfunction
 - Hepatitis (AST or ALT ≥ 1000 IU) or painful hepatomegaly
 - Altered mental status
 - Myocarditis
- Co-infection requiring inpatient management
- Co-existing conditions or social risk (on a case-by-case basis):
 - Conditions: hypertension, diabetes, asthma, chronic kidney disease, chronic liver disease, peptic ulcer disease or other gastritis, body-mass index ≥ 30 kg/m², receiving anticoagulation medications
 - Social risk: Age <1 year or >65 years, living alone or has poor access to healthcare facilities, lack of transportation, unstable housing, extreme poverty

Clinical Improvement Criteria

- Progressive waning of warning signs and general symptoms
- Stable vital signs
- Normal urine output ($>0.5 - 1.5$ mL/kg/hr)
- Adequate oral intake
- Increase in appetite

Discharge Criteria for Groups B1, B2, and C

All clinical and laboratory criteria must be met.

Clinical criteria:

- Absence of fever for 48 hrs without administering antipyretics
- Improved appetite
- Vital signs within normal range
- Urine output $0.5 - 1.5$ mL/kg/hr
- Normal work of breathing
- No evidence of bleeding

Laboratory criteria:

- Increasing trend in platelet counts
- Stable hematocrit without administration of intravenous fluids

Oral Fluid Management

Basal fluid requirements

- Adults:
 - 18–65 years: 30–35 mL/kg
 - >65 years: 25 mL/kg
- Children:
 - 1–10 years: 100–150 mL/kg or
 - 11–18 years: 1,000 mL + 50 mL for every kg over 10 kg
- Account for increases in oral fluid requirements due to diarrhea, vomiting, sweating, fever (basal needs increase by 13% for every degree over 38.0°C), and dehydration

Choice of Initial Intravenous Fluid

Crystalloids

- Lactated Ringers — contains 131 mmol/L sodium and 115 mmol/L chloride; avoid in patients with severe hyponatremia
- 0.9% Normal Saline — large volumes can exacerbate acidosis; contains elevated sodium and chloride levels (154 mmol/L each); avoid when chloride levels exceed 105 mmol/L

Colloids

- Use with up to two doses is recommended only in refractory shock after crystalloid solutions have been administered
- Dependent on local availability
- Dextrans can exacerbate hemorrhage

Maintenance fluid rates (Holliday & Segar formula)

Use ideal body weight (IBW) in patients who are overweight

- 4 mL/kg/hr for the first 10 kg of IBW
- 2 mL/kg/hr for the next 10 kg of IBW
- 1 mL/kg/hr for every additional kg of IBW
- Lower IV fluid rates than those recommended may be used for patients who are >65 years, pregnant, or have volume-sensitive conditions such as heart failure, chronic liver disease, and end-stage renal disease

Treatment of Hemorrhagic Shock

- 5–10 mL/kg packed red blood cells
- 10–20 mL/kg of whole blood
- Transfusion of platelets or fresh frozen plasma is not recommended

Normal Vital Signs

Age	Estimated Weight	Normal Heart Rate Range	Average HR	Normal Respiratory Rate Range	Hypotension Level (Systolic BP)
1 month	4 kg	110-180	145	40-60	<70
6 months	8 kg	110-170	135	25-40	<70
12 months	10 kg	110-170	135	22-30	<72
2 years	12 kg	90-150	120	22-30	<74
3 years	14 kg	75-135	120	22-30	<76
4 years	16 kg	75-135	110	22-24	<78
5 years	18 kg	65-135	110	20-24	<80
6 years	20 kg	60-130	100	20-24	<82
8 years	26 kg	60-130	100	18-24	<86
10 years	32 kg	60-110	85	16-22	<90
12 years	42 kg	60-110	85	16-22	<90
14 years	50 kg	60-110	85	14-22	<90
≥15 years		60-100	80	12-18	<90

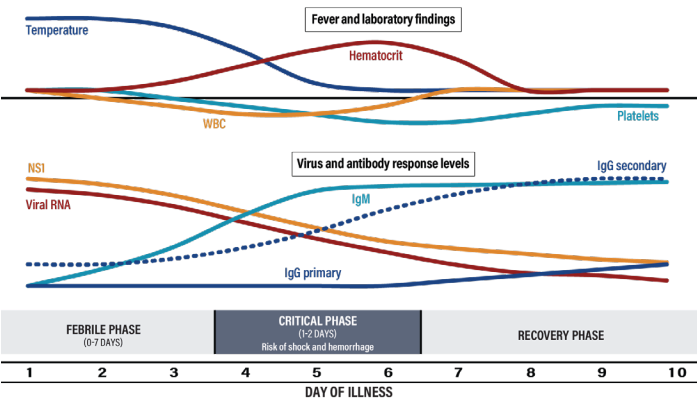
Hemodynamic Assessment

Hemodynamic Parameters	Stable Circulation	Compensated Shock	Hypotensive Shock
Conscious level	Clear and lucid	Clear and lucid	Restless, combative
Capillary refill	Brisk (≤2 sec)	Prolonged (>2 sec)	Very prolonged, mottled skin
Extremities	Warm and pink	Cool peripheries	Cold, clammy
Peripheral pulse volume	Good volume	Weak and thready	Feeble or absent
Heart rate	Normal heart rate for age	Tachycardia for age	Severe tachycardia or bradycardia in late shock
Blood pressure	▶ Normal blood pressure for age ▶ Normal pulse pressure for age	▶ Normal systolic pressure, but rising diastolic pressure ▶ Narrowing pulse pressure ▶ Postural hypotension	▶ Narrow pulse pressure (≤ 20 mmHg) ▶ Hypotension ▶ Unrecordable blood pressure
Respiratory rate	Normal respiratory rate for age	Tachypnea	Hyperpnea or Kussmaul's breathing (metabolic acidosis)
Urine output	Normal	Reducing trend	Oliguria or anuria

Clinical signs and symptoms and laboratory findings to differentiate dengue, Zika, and chikungunya

Certainty of the evidence	Signs and Symptoms		
	Dengue	Chikungunya	Zika
HIGH (findings that differentiate them)	- Thrombocytopenia - Progressive increase in hematocrit - Leukopenia	Arthralgias	Pruritus
MODERATE (findings that probably differentiate them)	- Anorexia or hyporexia - Vomiting - Abdominal pain - Chills - Hemorrhages (includes bleeding on the skin, mucous membranes, or both)	Rash Conjunctivitis Arthritis Myalgias or bone pain	Rash Conjunctivitis
LOW (findings that may differentiate them)	- Retro-ocular pain - Hepatomegaly - Headache - Diarrhea - Dysgeusia - Cough - Elevated transaminases - Positive tourniquet test	Hemorrhages (includes bleeding on the skin, mucous membranes, or both)	Adenopathies Pharyngitis or odynophagia

Guidelines for the Clinical Diagnosis and Treatment of Dengue, Chikungunya, and Zika. Washington, D.C.: Pan American Health Organization; 2022
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Paz-Bailey G, Adams LE, Deen J, Anderson KB, Katzelnick LC. Dengue. Lancet. 2024;403(10427):667-682. doi:10.1016/S0140-6736(23)02576-X

